Statement of Invention, and therefore, a supplemental oath or declaration is not required under 37 CFR 1.67. If the examiner should disagree, however, Applicants further submit that the objection to the declaration is a formality the correction of which is not necessary to further consideration of the claims. Therefore, Applicants request that any request for a supplemental declaration be held in abeyance until allowable subject matter is indicated in this case. This will prevent Applicants from having to submit a supplemental declaration for claims that may not ultimately issue in a patent in this case.

In response to the rejection under 35 U.S.C. § 112, first paragraph, Claims 89-111 are now canceled and Claims 112-128 are submitted in compliance with 35 U.S.C. §112, first paragraph. Therefore, the rejection under 35 U.S.C. § 112, second paragraph, is believed to be overcome and no further rejection on this basis is anticipated. If, however, the Examiner disagrees, the Examiner is invited to telephone the undersigned who will be happy to work with the Examiner in a joint effort to derive mutually satisfactory claim language.

Turning now to the merits, in order to expedite issuance of a patent in this case, Applicants have now canceled Claims 89-111 and added Claims 112-128 to clarify the patentable features of the claimed invention over the cited references. Specifically, Claims 112, 121 and 126 recite a method of forming a barrier metal film formed of a nitride film including tungsten by thermal CVD. The method includes positioning a substrate in a processing vessel, maintaining a predetermined pressure in the processing vessel, and forming a film containing tungsten on the substrate by supplying gas containing tungsten and gas containing hydrogen into the processing vessel and shutting off the supplying of the gas containing tungsten and the gas containing hydrogen into the processing vessel. Also recited is removing the gas containing tungsten from the processing vessel by supplying an inert gas into the processing vessel, and nitriding the film containing tungsten by supplying a gas

containing nitrogen. In Claim 112, the gas containing tungsten is WF_6 and the gas containing hydrogen is SiH_4. In Claim 126, the gas containing tungsten is WF_6 and the gas containing hydrogen is SiH_4 or H_2.

In contrast, the cited reference to Meikle discloses a method of forming a WN film by CVD using $WF_6/NH_3/Ar/H_2$ or SiH_4 gas (see page 4, lines 13-18). Agnello discloses a method of forming a TaSiN film by PVD, in which a Ta_2Si_3 cathode (monolithic target) is reactively sputtered in an N_2 atmosphere (see col. 5, lines 62-64). In addition, there is a disclosure reading "forming an oxygen or dopant barrier layer by either a chemical vapor deposition or a physical vapor deposition technique (see col. 2, lines 64-67). However, only PVD is disclosed in examples and CVD is not disclosed at all. Park discloses a method of forming a WN film in an LPCVD chamber by use of $WF_6/NH_3/H_2$ gas (see col. 2, lines 44-52). In addition, Park discloses that plasma treatment is performed by processing the surface of a wafer with an RF plasma or ECR plasma using a non-active gas such as Ar, H_2, N_2 and He prior to the deposition of the WN film (see col. 3, lines 1-3). This treatment is performed in order to improve the performance characteristics of the resulting barrier field. Fleming discloses a method of forming a W-Si-N or WN film by using WF_6/Si_2H_6 or SiH_4/NH_3 gas (see col. 4, lines 34-36 or col. 6, lines 30-32). Fleming is concerned with a composition ratio of a W-Si-N film, which is varied by changing the flow ratio of film forming gases. Lee discloses that a tungsten silicide layer is formed by using WF_6/SiH_4 or SiH_2Cl_2 source gas (see col. 4, lines 1-3) and that a diffusion preventing film such as Wn_x or WsiN is formed on a tungsten silicide layer (see col. 6, lines 2-5).

However, none of the references disclose or suggest the feature of the invention that a tungsten containing film is formed and then nitrided with a nitrogen-containing gas, thereby forming a tungsten-containing nitride film by thermal CVD. Thus, the combination of the

cited references to Meikle, Agnello, Park, Fleming, and Lee does not teach each and every limitation of the invention as claimed in new Claims 112, 121, and 126.

Furthermore, in the methods of the cited references, since a film is formed by use of a mixture of WF_6 gas and NH_3 gas, a by-product tends to be produced through the reaction between the gases, with the result that particles are easily generated. In contrast, in the present invention, since a step of forming a film containing tungsten and a step of nitriding the film are performed separately, a by-product is rarely produced and thereby particle generation is prevented. Hence, high diffusion barrier characteristics, low resistance, adhesiveness, and control of film thickness can be further improved (see Applicants' specification, page 20, lines 14-17; page 21, lines 15-21; page 22, lines 19-21; and page 23, lines 18-24).

Moreover, the barrier film of the present invention formed of a nitride film containing tungsten, which is prepared by forming a tungsten-containing film and nitriding the tungsten-containing film with a nitrogen containing gas, can be improved in diffusion barrier characteristics between an interlayer insulating film and metal wiring, adhesiveness between the metal wiring and the interlayer insulating film, and low resistance, when the wiring is formed in a semiconductor device having 1G bits or more. Furthermore, the diffusion barrier characteristics to a gate and a capacitor insulating film, the adhesiveness between the gate and capacitor insulating film, and low resistance between them, can be improved when the gate and capacitor electrode are formed. By virtue of these improvements, it is possible to attain high integration, multi-layer construction of a semiconductor integration circuit, and high-speed circuit operation.

Finally, Applicants note that the Official Action combines at least four references to maintain the rejection of the claims and includes only conclusory statements such as

"conventional," "obvious," and "within the purview of one skilled in the art" to support the combination of references. However, the Official Action does not articulate why one of ordinary skill in the art would be motivated to combine each of the four references to arrive at Applicants' claimed invention. Applicants respectfully submit that this is in violation of CAFC judicial precedent *In Re Lee*, (00-1158 Fed. Cir., January 18, 2002), which requires evidence of the inventive step, teaching, suggestion or motivation in the prior art. Thus, Applicants submit that the limitations of new Claims 112-128 are not taught by the prior art as discussed above, and further that there is no motivation to combine the cited references.

Consequently, in view of the present amendment, no further issues are believed to be outstanding in the present application, and the present application is believed to be in condition for formal Allowance. An early and favorable action is therefore respectfully requested.

Respectfully submitted,

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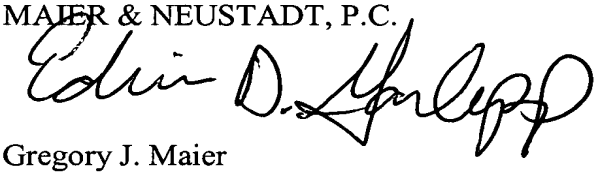

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